

Abstract of the Disclosure

Micro-electromechanical tools for minimally invasive techniques including microsurgery. These tools utilize composite shape memory alloy (SMA), shape memory polymer (SMP) and combinations of SMA and SMP to produce catheter distal tips, actuators, etc., which are bistable. Applications for these structures include: 1) a method for reversible fine positioning of a catheter tip, 2) a method for reversible fine positioning of tools or therapeutic catheters by a guide catheter, 3) a method for bending articulation through the body's vasculature, 4) methods for controlled stent delivery, deployment, and repositioning, and 5) catheters with variable modulus, with vibration mode, with inchworm capability, and with articulated tips. These actuators and catheter tips are bistable and are opportune for in vivo usage because the materials are biocompatible and convenient for intravascular use as well as other minimal by invasive techniques.